

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Mamoru Yasui, et al.

Serial No.: 10/585,687

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For: ALIPHATIC POLYESTER RESIN
COMPOSITIONS, MOLDED ARTICLES
OF ALIPHATIC POLYESTER RESIN
AND METHOD OF PRODUCING SAME

Group Art Unit: 1796

Examiner: G. Mesh

Confirmation No.: 4706

Attorney Docket: TKMT P135

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Deborah Neill

DECLARATION UNDER 37 CFR § 1.132

Commissioner for Patents
Alexandria, Virginia 22313

Sir:

I, Osaki Tatsuhiko, declare as follows:

1. I am the second-named inventor of the above captioned patent application.
2. I am familiar with the prosecution history of the above captioned patent application, inclusive of the Office Action mailed May 27, 2010 from the United States Patent and Trademark Office.
3. I reviewed the Office Action dated May 27, 2010 and realized that JP2002-0807010 (Satoshi), cited by the examiner, discloses aliphatic polyester resin composition

using 5-sulfoisophthalate dimethyl sodium salt (SIPDM) as nucleating agent and that US2005/0027098 (Hayes), also cited by the examiner, discloses metal salt of a lower alkyl ester of 5-sulfoisophthalic acid as aromatic sulfonate component. Satoshi and the present invention may appear to be similar in that 5-sulfoisophthalate dimethyl salt is used as nucleating agent but the present invention is distinguishable in that the salt to be used is potassium, rubidium, barium, strontium and calcium while Satoshi is using a sodium salt. Although sodium and potassium are both alkali metals and are often considered to be similar, it makes a significant difference within the context of the present invention whether it is a potassium salt or a sodium salt that is being used as nucleating agent. In order to demonstrate this surprising result, I have conducted additional reference experiments by using sodium, lithium, cesium, beryllium and magnesium salts instead of the salts according to the present invention. These reference experiments using these additional salts were carried out under the same conditions as the test and comparison experiments of which the results are presented in the application, and their results are presented below in Tables 1a, 2a and 3a which incorporate respectively Tables 1, 2 and 3 for the convenience of comparison and use the same symbols as used in Tables 1, 2 and 3 (except C-6, C-7, C-8, C-9 and C-10 which are defined as follows:

- C-6: 5-sodium sulfo-isophthalic acid dimethyl ester
- C-7: 5-lithium sulfo-isophthalic acid dimethyl ester
- C-8: 5-cesium sulfo-isophthalic acid dimethyl ester
- C-9: 5-beryllium sulfo-isophthalic acid dimethyl ester
- C-10: 5-magnesium sulfo-isophthalic acid dimethyl ester

Table 1a

Example	Kind	Aliphatic polyester resin composition							
		Aliphatic polyester resin		Nucleating agent for crystallization				Others	
		Kind	Amount (Part)	Salt of Aromatic sulfonate		Other nucleating agents for crystallization		Kind	Amount (Part)
				Kind	Amount (Part)	Kind	Amount (Part)		
<u>Test</u>									
1	P-1	L-1	100	C-1	0.1				
2	P-2	L-1	100	C-1	1				
3	P-3	L-1	100	C-1	2				
4	P-4	L-2	100	C-2	1				
5	P-5	L-1	100	C-1	1				
				C-2	1				
6	P-6	L-1	100	C-1	0.05				
7	P-7	L-1	100	C-1	5				
8	P-8	L-1	100	C-1	1	D-1	1		
9	P-9	L-1	100	C-1	1	D-3	1		
10	P-10	L-2	100	C-1	1			D-4	0.1
								D-5	1
11	P-11	L-2	85	C-1	1				
		L-3	15						
12	P-12	L-2	85	C-1	1	D-3	11	D-4	0.1
		L-3	15					D-5	1
13	P-13	L-1	100	C-3	1				
14	P-14	L-1	100	C-4	1				
15	P-15	L-1	100	C-5	1				
16	P-16	L-1	100	C-1	0.5				
				C-3	0.5				
17	P-17	L-1	100	C-2	0.5				
				C-3	0.5				
18	P-18	L-1	100	C-1	0.5				
				C-4	0.5				
19	P-19	L-1	100	C-1	0.5				
				C-2	0.5				
				C-3	0.5				
<u>Comparison</u>									
1	R-1	L-1	100			D-1	1		
2	R-2	L-1	100			D-2	1		
3	R-3	L-1	100			D-3	10		
4	R-4	L-2	85			D-1	1		
		L-3	15						
5	R-5	L-2	85			D-1	1	D-4	0.1
		L-3	15			D-3	10	D-5	1
<u>Reference</u>									
1	R-6	L-1	100	C-6	1				
2	R-7	L-1	100	C-7	1				
3	R-8	L-1	100	C-8	1				
4	R-9	L-1	100	C-9	1				
5	R-10	L-1	100	C-10	1				

Table 2a

Examples	Kind of aliphatic polyester resin compound	Evaluation			
		Glass transition temperature (°C)	Crystallization-initiating temperature (°C)	Crystallization peak temperature (°C)	Crystallization-terminating temperature (1/g)
Test Examples					
1	P-1	61.5	137.4	130.0	43.8
2	P-2	63.4	138.9	132.2	42.6
3	P-3	61.2	139.8	133.9	43.1
4	P-4	63.2	126.7	120.5	38.7
5	P-5	61.4	132.0	126.9	41.0
6	P-6	64.2	133.0	126.5	45.2
7	P-7	61.1	140.5	135.7	41.1
8	P-8	61.6	136.9	129.6	42.8
9	P-9	60.3	136.3	129.6	42.7
10	P-10	60.7	135.1	127.0	35.8
11	P-11	62.0	134.1	127.1	36.7
12	P-12	60.5	130.2	122.1	31.6
13	P-13	61.3	135.6	128.7	43.4
14	P-14	71.5	136.2	130.1	42.6
15	P-15	61.3	132.4	126.6	40.9
16	P-16	63.1	138.7	131.5	43.9
17	P-17	66.4	131.4	124.8	41.4
18	P-18	65.9	134.5	128.4	41.5
19	P-19	64.1	133.7	127.7	42.1
Comparison Examples					
1	R-1	62.2	119.4	112.3	38.9
2	R-2	59.8	*1	*1	*1
3	R-3	61.5	116.5	107.1	31.7
4	R-4	60.5	116.0	107.2	27.0
5	R-5	61.0	115.7	106.4	25.2
Reference Examples					
1	R-6	61.2	131.3	126.3	41.0
2	R-7	60.8	126.8	120.7	39.0
3	R-8	61.3	125.3	118.1	40.5
4	R-9	60.8	128.2	120.9	40.1
5	R-10	60.2	129.1	122.1	41.5

Table 3a

Example	Kind of aliphatic polyester resin compound	Molding condition (Temperature (°C)/time(sec))	Evaluation at time of molding Mold release deformation	Evaluation of molded articles		
				Bending test (Strength (MPa)/Elastic ratio (MPa))	Deflection temperature under load (°C)	Crystallinity (Absolute (%)/relative (%))
Test 20	P-1	110/40	A	105.2/4358	132.5	48.9/90.5
21	P-2	110/40	A	108.0/4447	124.9	50.7/89.7
22	P-3	110/40	A	108.5/4420	127.8	55.3/95.7
23	P-4	110/40	A	107.6/4350	132.9	53.2/92.2
24	P-5	110/40	A	105.6/4450	133.0	50.5/87.0
25	P-6	110/40	A	109.8/4470	130.2	49.0/81.0
26	P-7	110/40	A	108.7/4521	132.1	60.3/97.8
Comp. 6	R-1	110/40	D	*2/*2	*2	*2/*2
7	R-2	110/40	D	*2/*2	*2	*2/*2
8	R-3	110/40	D	*2/*2	*2	*2/*2
Ref 6	R-6	110/40	C	102.9/4291	116.0	42.1/80.9
7	R-7	110/40	C	105.8/4415	115.1	39.3/77.7
8	R-8	110/40	C	102.3/4298	113.4	40.5/77.6
9	R-9	110/40	C	100.9/4307	113.2	39.9/76.3
10	R-10	110/40	C	101.5/4216	112.8	37.1/75.0
Test 27	P-11	110/60	B	92.2/3300	101.2	47.8/95.7
28	P-12	110/60	A	89.9/4154	103.2	46.0/98.9
Comp. 9	R-4	110/60	D	*2/*2	*2	*2/*2
10	R-5	110/60	D	*2/*2	*2	*2/*2
Test 29	P-1	110/120	A	111.8/4370	133.3	50.8/93.7
30	P-2	110/120	A	116.7/4416	126.2	59.7/100.0
31	P-3	110/120	A	105.8/4486	130.4	60.2/100.0
32	P-4	110/120	A	106.5/4247	138.9	54.0/93.3
33	P-5	110/120	A	103.0/4348	134.5	48.2/85.5
34	P-6	110/120	A	111.8/4370	133.3	48.9/82.6
35	P-7	110/120	A	111.4/4598	134.4	63.9/100.0
36	P-8	110/120	A	101.7/4195	134.6	49.3/83.9
37	P-9	110/120	A	118.6/4385	129.7	50.8/84.8
38	P-10	110/120	A	125.4/4242	128.3	48.2/85.5
39	P-13	110/120	A	102.4/4436	129.4	49.7/90.7
40	P-14	110/120	A	99.5/4489	129.0	51.4/91.8
41	P-15	110/120	A	106.0/4575	123.8	48.3/89.5
42	P-16	110/120	A	110.6/4549	123.5	52.8/93.0
43	P-17	110/120	A	104.2/4475	133.6	48.3/87.9
44	P-18	110/120	A	109.2/4631	130.5	49.2/86.3
45	P-19	110/120	A	106.2/4492	127.2	50.1/89.5
Comp. 11	R-1	110/120	B	106.6/4267	113.6	41.3/80.4
12	R-2	110/120	D	*2/*2	*2	*2/*2
13	R-3	110/120	B	106.5/5283	115.0	42.1/80.9
Ref 11	R-6	110/120	B	103.1/4301	122.5	47.3/83.1
12	R-7	110/120	B	106.0/4453	117.5	42.5/81.5
13	R-8	110/120	B	101.1/4316	118.0	44.2/80.3
14	R-9	110/120	B	100.0/4321	119.1	44.5/81.2
15	R-10	110/120	B	104.0/4199	117.3	42.3/79.6

Table 3a (continued)

Example	Kind of aliphatic polyester resin compound	Molding condition (Temperature (°C)/time(sec))	Evaluation at time of molding Mold release deformation	Evaluation of molded articles		
				Bending test (Strength (MPa)/Elastic ratio (MPa))	Deflection temperature under load (°C)	Crystallinity (Absolute (%)/relative (%))
Test 46	P-11	110/120	A	95.0/3450	103.8	46.5/92.5
47	P-12	110/120	A	90.2/4231	105.5	47.3/100.0
Comp. 14	R-4	110/120	B	91.2/3100	85.0	37.7/76.7
15	R-5	110/120	B	90.1/4266	99.6	38.0/75.0
Test 48	P-2	90/40	A	121.4/4295	100.9	43.3/84.6
49	P-6	90/40	B	116.8/4210	100.5	42.7/82.0
Comp. 16	R-1	90/40	D	*2/*2	*2	*2/*2
17	R-2	90/40	D	*2/*2	*2	*2/*2
18	R-3	90/40	D	*2/*2	*2	*2/*2

4. It should be clear by considering Tables 1a-3a incorporating Tables 1-3 that the favorable results obtainable according to the present invention cannot be attained by the use of the kinds of salt disclosed by Satoshi and Hayes.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code), and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Tatsuhiko Osaki
Osaki Tatsuhiko

14 August 2010
Date